

Town Wireless Upgrade

The previous Town wireless network connected 5 buildings. They were the Town Hall, Lunenburg High School, Turkey Hill Middle School, TCP Elementary School, and the Brooks House. We could run the small domain and internet over it but nothing else, as the speed was only 5mbs.

The Upgrade that went live last January connected the Town Hall and High School with a gigabit backbone and a 54g backup connection. The average connected speed is now 42mbs. This will allow 10 buildings to be connected (although 11 were wired). There are currently seven buildings connected. Routers were installed in these buildings by Derek Dufresne. I am not sure of the cost. All other items (as far as I know) are included in the attached installation costs. These buildings and their wireless installation costs are:

- Town Hall
 - \$14,469.13
- Lunenburg High School
 - \$ 3,183.33
- Turkey Hill Middle School
 - 3,4461.63
- TCP Elementary School
 - \$ 2,950.13
- Brooks House
 - \$ 2,807.13
- Ritter Building (new from the upgrade)
 - \$ 2,565.13
- Primary School
 - \$ 6,564.02

The following buildings are part of the wireless upgrade and have the antennas and drops, but do not currently have routers needed to bring them online. In addition, if these locations are brought online, they should have servers installed in order to utilize our network applications. Without a server, the only thing they can share is the internet:

- Eagle House (Derek says he already has a router for them)
 - \$ 2,411.68
- Town Library (They currently have network access via a direct line to LHS, need router for wireless)
 - \$ 2,848.93
- Public Safety (Need a router/firewall. They already have a server with their own domain)
 - \$ 6,449.41
- Old Primary School (not in use)
 - \$ 2,751.03

Buildings that currently remain outside of our network are:

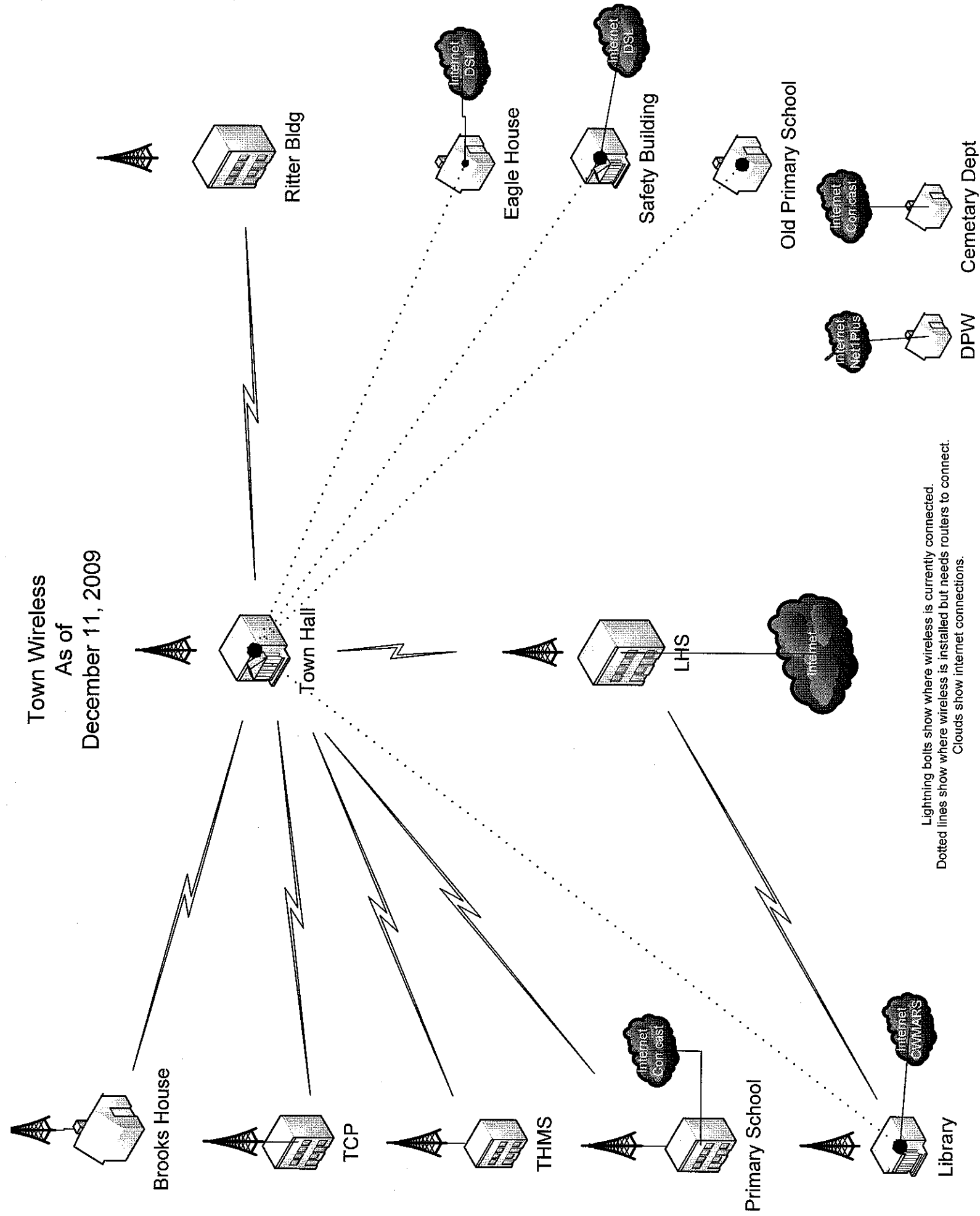
- DPW
- Cemetary
- Teen Center

I think the plan for the Eagle House and the Town Library was to be able to use Munis, which was to be moved from the Town Hall server to the Data Center at the High School. However, I do not recommend moving Munis until existing infrastructure problems at the High School have been corrected. These problems are numerous and may take some time to resolve.

I am going to look into the possibility of setting up VPN to enable the Eagle House, DPW, and Cemetary access to Munis. There may be some setup costs involved with that, but I think that whether or not we use it for Munis, it should be a priority. Anyone with laptops should be able to access the network from home. And I especially need VPN access to the Town Hall network, which is not now available.

If at some point if you decide to include the Teen Center in the wireless plan, you could move the antenna and wiring from the Old Primary School. But again, there would be costs involved, mainly hiring someone to reinstall and reposition the equipment.

Town Wireless As of December 11, 2009



Lightning bolts show where wireless is currently connected.
Dotted lines show where wireless is installed but needs routers to connect.
Clouds show internet connections.

MVA.NET, Ltd. d/b/a USAi.net
P.O. Box 1805
Haverhill, MA 01831

Invoice

Invoice #: 00040283
Date: 11/24/08
Ship Via:
Page: 1

Bill To:

Town of Lunenburg
Town Hall
P.O. Box 135
Lunenburg, MA 01462-0135, USA

Ship To:

Lunenburg Technology Departmen
1079 Massachusetts Avenue
Main Office
Lunenburg, MA 01462, USA

Description	Amount	Tx
ITT37 Wireless Project	\$74,000.00	

Thanks for choosing USAi.net!

Your Order #: 09000122-00
Shipping Date:
Terms: C.O.D.

Freight:	\$0.00
Sales Tax:	\$0.00
Total Amount:	\$74,000.00
Amount Applied:	\$0.00
Balance Due:	\$74,000.00

Relay / Bridge



Town of Lunenburg Wireless Muni-Net BOM

Town Library

Quant.	Description
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1	RF Analysis
1	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	200' Category 5E outdoor cable
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
1	Installation of Cat-5
1	Installation of passthru, blocks, etc
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 2,848.93

Notes: Replace existing mast/mount with elbow mount, replace wiring with new outdoor cat5e following existing path.



Town of Lunenburg Wireless Muni-Net BOM

Town Hall

Quant. Description

- | | |
|---|---|
| 2 | RF Analysis |
| 3 | Configuration & Integration of each component onto the network |
| 3 | Performance & throughput testing per link |
| 2 | Additional labor cost on all tower work. |
| 2 | Calibration of azimuth, polarity, beam and frequency. |
| 1 | Wall mount cabinet with locking door |
| 3 | Cat-5E Patch Cable |
| 3 | 150' Category 5E outdoor cable |
| 1 | 8 Port Switch supporting 10/100 Mbps. |
| 3 | Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL |
| 3 | Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11 |
| 3 | Ground Wire w/ Grounding Clamp (12 Gauge) |
| 2 | LMR 400' 1' (1) |
| 2 | LMR 400' 10' (1) |
| 2 | Lightning suppressor, gas discharge for LMR cable (1) |
| 3 | Wall Mount Antenna Brackets (Elbow) |
| 4 | Super Strut 3' Length |
| 4 | Super Strut Channel Clamp |
| 4 | Concrete Lag Anchors 3/8"x 2" (set of 2) |
| 4 | Clamps, misc nuts, bolts, ties and paint |
| 1 | QB 11 5054 R Unit with 24 dBi integrated antenna (Base) |
| 2 | Proxim Tsunami MP.11 Model 5054-R Ruggedized Base Station Unit with N-Type |
| 2 | 16 dBi Sectorized Antenna, 90 degree, 5.15-5.875 GHz ISM band, Ideal for use Proxim |
| 3 | Installation of Cat-5 |
| 3 | Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work) |

\$ 14,469.13

Notes: Equipment being mounted in cupola - Antenna painted to match structure.



Town of Lunenburg Wireless Muni-Net BOM

Elementary School

Quant. Description

1	RF Analysis
1	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	250' Category 5E outdoor cable
2	1/2" Conduit/PVC (blocks, elbow, couplings)
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
2	Concrete Lag Anchors 3/8"x 2" (set of 2)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
1	Installation of Cat-5
1	Installation of conduit, couplings, passthru, blocks, etc
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 2,950.13

Notes: Replace existing mast with 10' Ridgid mast, replace existing cabling with outdoor cat5e following existing path.



Town of Lunenburg Wireless Muni-Net BOM

Brooks House

Quant. Description

1	RF Analysis
1	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	150' Category 5E outdoor cable
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
2	Concrete Lag Anchors 3/8"x 2" (set of 2)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
1	Installation of Cat-5
1	Installation of couplings, passthru, blocks, etc
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 2,807.13

Notes: Replace existing mast with elbow mount, replace existing cabling with outdoor cat5e following existing path.



Town of Lunenburg Wireless Muni-Net BOM

High School

Quant. Description

- | | |
|-----|---|
| 1 | RF Analysis |
| 1 | Configuration & Integration of each component onto the network |
| 1 | Performance & throughput testing per link |
| 1.5 | Calibration of azimuth, polarity, beam and frequency. |
| 1 | Cat-5E Patch Cable |
| 1 | 250' Category 5E outdoor cable |
| 7 | 1/2" Conduit/PVC (blocks, elbow, couplings) |
| 1 | Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL |
| 1 | Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11 |
| 1 | Ground Wire w/ Grounding Clamp (12 Gauge) |
| 1 | 10' Galvanized Mast (Ridgid) |
| 2 | Super Strut 3' Length |
| 2 | Super Strut Channel Clamp |
| 2 | Concrete Lag Anchors 3/8"x 2" (set of 2) |
| 1 | Clamps, misc nuts, bolts, ties and paint |
| 1 | Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated |
| 1 | Installation of Cat-5 |
| 1 | Installation of conduit, couplings, passthru, blocks, etc |
| 2 | Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work) |

\$ 3,183.33

Notes: Replace existing mast with 10' ridgid mast, replace existing cabling with outdoor cat5e following existing path. Encase cabling in conduit from mast over side of building to computer room.



Town of Lunenburg Wireless Muni-Net BOM

Police / Fire

Quant. Description

- | | |
|---|---|
| 1 | RF Analysis |
| 1 | Configuration & Integration of each component onto the network |
| 1 | Performance & throughput testing per link |
| 2 | Calibration of azimuth, polarity, beam and frequency. |
| 1 | Cat-5E Patch Cable |
| 1 | 350' Category 5E outdoor cable |
| 3 | 1/2" Conduit/PVC (blocks, elbow, couplings) |
| 1 | Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL |
| 1 | Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11 |
| 1 | Ground Wire w/ Grounding Clamp (12 Gauge) |
| 1 | Non-Penetrating Roof Mount 60"x 60" |
| 1 | Roof Pads for BRM435. Includes (4) 62" x 18" x 3/8" and (1) 16 x 12 3/8" x 3/8" mats. |
| 1 | Roof Mount Weights (16 - 480 lbs) |
| 1 | 50' Telescoping Mast (1/8" Guy Wire, Turn Buckles, Anchors, Hooks, Clamps) |
| 4 | Super Strut 3' Length |
| 4 | Super Strut Channel Clamp |
| 4 | Concrete Lag Anchors 3/8"x 2" (set of 2) |
| 4 | Clamps, misc nuts, bolts, ties and paint |
| 1 | QB 11 5054 R Unit with 24 dBi integrated antenna (Subscriber) |
| 1 | Installation of Cat-5 |
| 2 | Installation of conduit, couplings, passthru, blocks, etc |
| 2 | Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work) |
| 1 | Installation & assembly of Non-Penetrating Roof Mount |
| 1 | Installation of Telescoping Mast, Guy Wire and Misc. Peripherals |

\$ 6,449.41

Notes: Install 50' Telescoping mast with non-penetrating roof mount run lines in conduit to existing conduit then into wire chase to MDF.



Town of Lunenburg Wireless Muni-Net BOM

Ritter Library

Quant.	Description
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0.5	RF Analysis
0.5	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	200' Category 5E outdoor cable
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
2	Concrete Lag Anchors 3/8"x 2" (set of 2)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
1	Installation of Cat-5
1	Installation of couplings, passthru, blocks, etc
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 2,565.13

Notes: Install elbow mount off left side of main building, run lines to back of building to follow telco ingress.



Town of Lunenburg Wireless Muni-Net BOM

Primary School

Quant.	Description
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1	RF Analysis
1	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1	Additional labor cost on all tower work.
2	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	350' Category 5E outdoor cable
3	1/2" Conduit/PVC (blocks, elbow, couplings)
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Non-Penetrating Roof Mount 60"x 60"
1	Roof Pads for BRM435. Includes (4) 62" x 18" x 3/8" and (1) 16 x 12 3/8" x 3/8" mats.
1	Roof Mount Weights (16 - 480 lbs)
1	50' Telescoping Mast (1/8" Guy Wire, Turn Buckles, Anchors, Hooks, Clamps)
4	Super Strut 3' Length
4	Super Strut Channel Clamp
4	Concrete Lag Anchors 3/8"x 2" (set of 2)
2	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
2	Installation of Cat-5
2	Installation of conduit, couplings, passthru, blocks, etc
2	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)
2	Installation & assembly of Non-Penetrating Roof Mount
1	Installation of Telescoping Mast, Guy Wire and Misc. Peripherals

\$ 6,564.02

Notes: Install 50' telescoping mast in AC area of roof on non-penetrating roof mount.
Guy wires attached to side walls on non rubber surface. Run Cat5e to 2nd floor cabling bundle then on to MDF following existing path.



Town of Lunenburg Wireless Muni-Net BOM

Senior Center

Quant. Description

0.5	RF Analysis
1	Configuration & Integration of each component onto the network
0.5	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	150' Category 5E outdoor cable
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
1	Installation of Cat-5
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 2,411.68

Notes: Install elbow mount on right corner of building run lines following telco ingress.



Town of Lunenburg Wireless Muni-Net BOM

Old Primary School

Quant. Description

1	RF Analysis
1	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	250' Category 5E outdoor cable
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
1	Concrete Lag Anchors 3/8"x 2" (set of 2)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
1	Installation of Cat-5
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 2,751.03

Notes: Install elbow mount to left side of building run cable down with existing telco to basement demark.



Town of Lunenburg Wireless Muni-Net BOM

Turkey Hill Middle Schl

Quant. Description

1	RF Analysis
1	Configuration & Integration of each component onto the network
1	Performance & throughput testing per link
1.5	Calibration of azimuth, polarity, beam and frequency.
1	Cat-5E Patch Cable
1	300' Category 5E outdoor cable
1	UPS - Uninterruptible Power Supply 350 VA
1	Proxim Wireless Power DC Injector for Tsunami MP.11 Quick Bridge.11 (R Models ONL
1	Proxim PoE Lightning Protector 70251 for Tsunami MP.11/QB.11
1	Ground Wire w/ Grounding Clamp (12 Gauge)
1	Wall Mount Antenna Brackets (Elbow)
2	Concrete Lag Anchors 3/8"x 2" (set of 2)
1	Clamps, misc nuts, bolts, ties and paint
1	Proxim Tsunami MP.11 Model 5054-R Ruggedized Subscriber Unit with Integrated
2	Installation of Cat-5
1	Installation of couplings, passthru, blocks, etc
1	Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work)

\$ 3,461.63

Notes: Install elbow mount to rear corner of auditorium. Run lines along soffet to computer room location.



Town of Lunenburg Wireless Muni-Net BOM

Backhaul Segment Providing 1.25 Gigabit

Quant. Description

- | | |
|----|--|
| 1 | RF Analysis |
| 2 | Configuration & Integration of each component onto the network |
| 1 | Performance & throughput testing per link |
| 2 | Calibration of azimuth, polarity, beam and frequency. |
| 2 | Cat-5E Patch Cable |
| 2 | 200' 6 Strand Multi-mode fiber. |
| 5 | 1/2" Conduit/PVC (blocks, elbow, couplings) |
| 1 | 10' Galvanized Mast (Rigid) |
| 1 | Proxim Wireless GigaLink 6651e-AC 60 GHz parabolic, 1.25 Gbps, 1000SX, Integral 13 |
| 12 | SC Multimode Connectors |
| 2 | Media Converter 1000 Mb. -1000Mb-TX to 1000Mb-FX SC MM 2KM |
| 2 | Fiber Rack Mount Enclosure Loaded w/ SC MM adapters 2 Panels of 6 |
| 4 | Installation of low voltage & fiber optic cable |
| 8 | Installation of conduit, couplings, passthru, blocks, etc |
| 6 | Installation of brackets, mounting hardware, antenna and etc. (Non-Tower Work) |

\$ 23,613.89

Note: This is the suggested primary link to the main network providing a 1.25 Gigabit link. Using 60 GHz frequency range. Re-align MP11 Subscriber to link with Base Station at Town Hall for Redundancy..



GL Summary

Vendor	7563	USA:NET	
Cash Account	0100	104000	GENERAL FUND CASH
Check number	45435	Date	12/18/2008
Warrant	31 09	Amount	74,000.00

Document	Invoice	Inv Date	PO	Voucher	Amount
19954	00041285	11/24/2008	9000122	53405	74,000.00